

**AH-1W AIRCRAFT WEAPON SYSTEM TRAINER , DEVICE 2F136****TRAINING CATEGORY:**

AVIATION (Operational Flight/Weapon Systems)

**ORIGINATING AGENCY:**

DCNO/AIR

**SECURITY CLASSIFICATION:**

Device 2F136 is unclassified.

**PURPOSE:**

To provide weapon system training for the Bell AH-1W Sea Cobra Attack Helicopter.

**INTENDED USE:**

In Government-supplied facilities to include provisions for conditioned air and electrical power. Used for training pilots and gunners with appropriate rank.

**FUNCTIONAL DESCRIPTION:**

Device 2F136 AH-1W Sea Cobra Weapon System Trainer (WST) consists of a gunner station and pilot station each complete with motion system, instructor station, computer system, linkage system, and power. These stations may run independently or may be integrated when running concurrent missions.

The device equipment and use is as follows:

**Trainee Station** - The trainee stations provide the students with the realistic cockpit environment that is necessary for effective training. The cockpit is a replica of the aircraft from the bulkhead forward of the pedals to the rear of the crew seats, and from the cockpit floor level to the overhead panels, with flooring that matches the production aircraft installation.

**Aircraft Simulation** - The simulated aircraft systems provide all functions related to aircraft operation, avionics, and the environment in which the aircraft and aircrews perform. Aircraft simulation includes flight dynamics and airframe subsystems,

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such as engines, flight controls, and electrical and hydraulic systems. Avionics simulation includes communication systems, such as radios, navigation systems, and compasses. Environmental simulation includes atmospheric characteristics (e.g., air density and winds), navigation-communication-related features (e.g., radio facilities), and Earth characteristics (e.g., magnetic variation). Aural motion, and visual cues enhance the realism of the environment for the trainees. Aircraft system malfunctions are also provided to allow practice in handling degraded conditions of the aircraft and in performing emergency procedures.

**Tactical Simulation** - Tactical simulation includes the defensive avionics, armament, and fire control capabilities of the aircraft. Defensive avionics can include both radar warning and jamming simulation. Armament simulation provides a wide range of armament configurations and appropriate stores management training.

**Aural Simulation** - Sound-synthesis equipment is used to provide high-fidelity simulation of aircraft sounds (e.g., engines, engine equipment, rotors, environmental equipment, related drive equipment, and the sounds of weapon firing and launch). The directional characteristics of simulated sounds are as realistically provided to the trainees in the simulator as in the actual helicopter. Aural cues resulting from instructor-induced malfunctions are automatically reflected through the sound generation software and hardware. Warning tones and other sounds apparent only through the trainees' headsets are supplied by the avionics simulation.

**Motion Simulation** - Motion simulation is provided by the six-degree-of-freedom synergistic motion system. The motion platform is supported and driven by six hydraulically powered actuators and can accommodate the additional weight of the visual system. The motion system includes proven design features and concepts that facilitate correlation between motion and visual cues. Cue shaping for the system is accomplished by software rather than hardware filters, which allows more precise shaping. Since rotational cue coordination errors are more easily discerned than lateral errors, a rotational lead-lag module is incorporated into the motion software.

Vibration cues are provided by seat shakers for each crew seat to provide the high-frequency

cues felt by the crew, but are not the result of translational or rotational movement of the aircraft. These vibrations can represent the frequencies and amplitudes of vibrations experienced in normal and emergency flight conditions.

**Instructional System** - The instructional system provides the means for an instructor to control the training situation from either the instructor station or the copilot position (using the auxiliary controls provided there). The easy-to-use features reduce the demands placed on the instructor by the system, thus permitting him to devote more of his attention to training the students.

**Computational System** - The Flight Training system is controlled and driven by a digital computer system. The computation system includes the signal conversion hardware, simulator peripheral equipment, and operating software that controls the simulation.

**PHYSICAL INFORMATION:**

Device 2F136 is permanently installed.

**OPERATIONAL EQUIPMENT:**

With the exceptions noted herein, all indicators and modified control panels for the AH-1W WST are simulated or modified from aircraft units. The simulated/modified units use  $\pm 15$  V dc power and  $\pm 10$  V dc analog signals. Except as noted, all indicators are self-contained and require only power and standard linkage components for operation and control.

The following is a list, grouped by drive types, of the instrument complement for the AH-1W WST. (Modified and actual aircraft units are noted; all others are simulated.)

**DC SERVOS**

Altimeter (pilot and gunner) two-speed servo  
Dual-torque meter (pilot and gunner)  
Gas producer tachometer (pilot and gunner)  
Attitude indicator (gunner)  
Bearing distance heading indicator (BDHI) (pilot and gunner) multidrive that also uses dc synchros  
Radar altimeter (pilot)  
Attitude indicator (pilot) modified from the aircraft part

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## DC SYNCHROS

Airspeed (pilot and gunner)  
 Vertical speed (pilot)  
 Fuel quantity (pilot)  
 Triple tachometer (pilot and gunner)  
 Outside air temperature (pilot)  
 BDHI (multidrive)  
 Magnetic compass (gunner) with external amplifier

## DC METER

Fuel pressure (pilot)  
 Engine oil temperature/pressure (pilot)  
 Slip ball (pilot) modified part of actual pilot sight  
 Turbine inlet temperature (pilot and gunner)  
 Hydraulic pressure (pilot)  
 Ammeter (pilot)  
 Voltmeter (pilot)  
 Transmission oil temperature/pressure (pilot)

The following units will be modified from aircraft units to allow dc control and operation.

Clock (pilot) dc control - enables freeze

Compass control (pilot) - provides dc analog output of manual synchronization.

ADF control (pilot) - provides dc analog output of frequency selection

These remaining units are used as aircraft parts without alteration.

Pilot steering indicator  
 Rounds remaining (gunner)

## EQUIPMENT REQUIRED (NOT SUPPLIED):

Students to use own helmets.

## INSTALLATION REQUIREMENTS:

A three-room complex is required:

**Simulator Room:** - 80' L x 40' W x 36' H

**Computer Room:** - 67' L x 32' W x 10' H

**Hydraulic Room:** - 21' L x 14' W x 10' H

The floor loading in the simulator room is 61,210 lbs for each motion system distributed over any one of the three motion baseplates.

Because the computers are installed on Government-provided raised flooring, the allowable floor loading is 250 lbs per Sq. Ft.

The hydraulic pump room floor loading is 27 lbs per Sq. In.

The device requires two types of environmental control: air conditioning in the simulator and computer rooms and ventilation in the hydraulic room.

Acoustic considerations are part of the simulator design and construction. The cockpit external noise is less than 60 decibels (dB) on the A scale for the motion system. Hydraulic power exhibits approximately 96 dB on the A scale. Signs describing the acoustical hazard and requiring personnel to wear ear protection in the hydraulic power room must be installed.

## PUBLICATIONS FURNISHED:

1. Operation Maintenance Manual, NTSC P-5214 (U)
2. Planned Maintenance System (PMS), NTSC P-5215 (U)
3. Commercial Computer Documentation, NTSC P-5216 (U)
4. Instructor's Utilization Handbook (IUH), NTSC P-5217
5. Engineering Drawings, Levels 2 and 3

## PERSONNEL: (ESTIMATED)

**Instructors:** Two (2) Qualified Pilots

**Operators:** Instructor operated

**Trainees:** Two (2), Gunner and Pilot

**Maintenance:** Three (3) Technicians

## CONTRACT IDENTIFICATION:

Manufactured by The Singer Co., Link Flight Simulation Div., Houston, TX under NAVTRASYS-CEN Contract No. N61339-84-C-0079.

## LOCAL STOCK NUMBER:

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